LAWRENCE LIVERMORE
REPORT

A weekly review of scientific and technological achievements from Lawrence Livermore National Laboratory, May 9-13, 2011

Fighting cancer with nukes

An accelerator developed at Lawrence Livermore that originally was used for nuclear weapons testing is now taking on a new life as a tool for treating cancer.

The high-energy particle accelerator shoots beam of protons -- radiation that destroys living tissues -- that can be aimed at a tumor.

Proton beams can kill tumors by releasing energy at a select depth, creating no collateral damage or health risks to the patient.

Compact Particle Acceleration Corporation is collaborating with Livermore researchers to downsize the current basketball court-size machines to something that can fit on a tabletop.

To see a video, go to the Web.

Lending a hand to foot and mouth

Cow stricken with foot-and-mouth disease in the UK. ***Photo by Pam Hullinger***

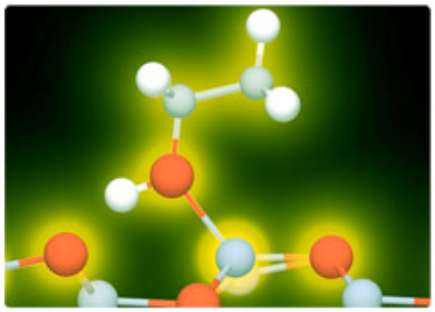
Research by Laboratory scientist Michael Dillon shows that virus-infected skin cells could be a source of infectious foot and mouth disease virus aerosols. His proposal is based on the fact that foot and mouth disease virus is found in skin, and airborne skin cells are known to transmit other diseases.

The proposal could lead to new methods for surveillance for foot and mouth disease (as in settled dust), the development of more effective control measures, and improved studies of the persistence of the disease in the environment. The research also may be applicable to how other infectious diseases are spread.

Foot and mouth is a highly contagious viral disease capable of causing widespread epidemics in livestock. The foot and mouth disease virus (FMDV) has multiple known routes of transmission. These include direct contact, indirect contact, ingestion and the respiratory or airborne pathway.

To read more, go to the Web.

Who needs batteries?



A battery-less chemical sensor relies on dynamic interactions of molecules with semiconductor nanowire surfaces that can induce electrical voltages between segments of nanowires.

The Lab's Yinmin "Morris" Wang and his colleagues certainly don't need batteries when it comes to detecting chemicals.

Wang has created a chemical nanosensor that relies on semiconductor nanowires rather than traditional batteries.

The device overcomes the power requirement of traditional sensors and is simple, highly sensitive and can detect various molecules quickly. Its development could be the first step in making an easily deployable chemical sensor for the battlefield.

The team used more than 15 different types of organic solvents and saw different voltages for each solvent. "This trait makes it possible for our nanosensors to detect different types of chemical species and their concentration levels," Wang said.

To read more, go to the Web.

Lab scientists win Early Career awards

Sofia Quaglioni, Yongqin Jiao and Peter Lindstrom.

Three Laboratory scientists have earned $7.5 million in funding through the Department of Energy Office of Science Early Career Research Program (ECRP).

Yongqin Jiao, a scientist in LLNL's Biosciences and Biotechnology Division, earned the award for her research looking into how microbes play a major role in the stability and transportation of uranium in natural aquatic systems.

Peter Lindstrom, a computer scientist in the Data Analysis Group at the Lab's Center for Applied Scientific Computing, earned his award for his research in alleviating the data-movement bottleneck in extreme-scale computing to accelerate numerical simulation and data analysis.

Sofia Quaglioni, a scientist in the Lab's Computational Nuclear Physics Group, earned her $2.5 million award for providing the research community with the theoretical and computational tools that will enable an accurate prediction for the fusion reactions that power stars and Earth-based fusion facilities.

To read more, go to the Web.

LLNL applies and advances science and technology to help ensure national security and global stability. Through multi-disciplinary research and development, with particular expertise in high-energy-density physics, laser science, high-performance computing and science/engineering at the nanometer/subpicosecond scale, LLNL innovations improve security, meet energy and environmental needs and strengthen U.S. economic competitiveness. The Laboratory also partners with other research institutions, universities and industry to bring the full weight of the nation's science and technology community to bear on solving problems of national importance.

To send input to the Livermore Lab Report, send e-mail mailto:labreport@llnl.gov.
The Livermore Lab Report archive is available on the Web.